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ABSTRACT

The paper considers the future of education, particularly special education, in terms of theory. Reviewed is research in neurology relating to contra-lateral development in brain hemispheres, cephalo-caudal and caudal-cephalo myelination patterns or neural systems, and integration of neural patterns and neo-cortical control of the brain. Also reported is nutritional research which gives indication that genetic factors are quantitatively and qualitatively limited in embryonic and fetal development. A revision of present research procedures and educational applications of theory is suggested. (Author/SBH)

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"Futurism - Neither Nurturing Nor Training for Education"

Humanism vs. Behaviorism
Personnel Preparation

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Educational prepa: tion and practice, particularly in special education, has had its roots in philosophy. Since the earliest recordings of man's concern for education, there has been a polorization in thought and practice. This polorization is best identified today as either humanistic or behavioristic. There is present evidence from the field of medicine, specifically Neurology, that should cause people of both philosophical persuasions to re-assess their basic assumptions about the nature of man. It is the premise of this paper that the assumptions underlying each of these positions must be brought to question. There is a need to take a new and different approach to the educational process, particularly as it effects the development of young children with special needs.

The premises for a new look are based upon evidence from both educational and medical research. An analysis of research, programs, and writings in both the humanistic and behavioral positions in education reveals what, to us, seems to be serious gaps in theory and practices. The humanistic approach assumes that the treatment of the child in global terms of self-concept, independence, autonomy, trust, and psychological safety not only will effect the general welfare of the child, but also will provide some guarantee of success in specific habits, skills, and attitudes.

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In contrast, the behavioral approach to the treatment of the child with careful attention to specific behavioral bits, precise training reinforcement, and controlled environment, assumes that this treatment of the child in managing skills and behaviors not only will develop these skills, but also will effect the more global abilities of the child through transfer and thus enhance the total welfare of the child.

To give credit to these approaches, there is consuming evidence in the research that children benefit from the application of either theory. Of course, each of the theoretical approaches measure only those attributes they philosophically assess to be important. Humanists have shown improved psychological states for children through their research and behaviorists have shown improved habits and skills in their research.

It is not necessary to totally negate either of these historical approaches. Instead a new and different theoretical stance must be assumed by people in the field if education is to advance beyond the philosophical sophistry of today. There is sufficient knowledge and research available to re-evaluate educational practice and to move toward a more effective knowledge and theory base in the future.

The basis of such a statement rests in the work and research done in the field of Neurology during the last thirty or more years in Russia and Japan and more recently in the United States and other countries. Research on the central nervous system, the cerebral cortex and brain lateralization has contributed greatly to knowledge that education must now act upon. For the purpose of this paper, this work can be generalized into several principles. They can be roughly stated as follows:

- Hemispheric dominance of the brain in specific neurological abilities has a corallary conta-lateral development over time.

- Integration of neural patterns in the brain continue much longer than historically thought; at least beyond two decades of life.
- The autonomic nervous system comes under control of the brain during fetal development and the first months of life.
- Embryonic and Fetal environments determine to a major extent the future of every child.
- Genetic factors are quantitatively, thus qualitatively limited, by health habits of the parents.

In the space available for this article, it is not possible to delve deeply into the research and theory of each of the areas of speciality mentioned above. But it will be in the interest of the readers to be directed to some principle research in each of the above areas.

New research has provided a great deal of information regarding the right and left hemispheres of the brain and the major functions the right and left hemispheres perform. Penfield has, for example, provided maps of sensory and motor functions in the cerebral cortex showing regions of the brain receiving sensory information and the regions of the brain that transmit motor function to the body (Penfield, 1959). Calder (1970) in his book, The Mind of Man, discusses cross-lateralization factors, and effects of surgical separation of the hemispheres. In addition, the research done by the Russians since World War II has extended our knowledge in the education and training of brain hemispheres to take over functions of damaged brain areas. Holger Hyden's work at the University of Goteberg in Sweden is brilliant evidence of cross-lateralization and the chemical effects upon the brain when such training occurs. Hyden has shown the increase of RNA control in the opposite hemisphere when right handed rats are trained to reach their food with the left hand (Calder, 1970).

Combined with these efforts at discovery of brain function and process is also the recent discoveries at Harvard University that brain development extends

for years after it has its total mass. The historically accepted concept has been that development has ended when the maximum weight and mass had been achieved. We now know that myelination does not occur until after the neuron has been formed and that utilization of the brain cell is dependent upon myelination for its effective action. If we add to this Guillemin's work on peptides (Guillemin, 1976) and Hyden's work on RNA (Calder, 1970) we can now see that brain function and process continues for several more years.

Another component of neural integration of brain development relates to how myelination of the neural networks occur. Developmentalists have long assumed that development proceeds in a cephalo-caudal pattern. Jackson (Milner, 1957) however has indicated that this is not true of the neural systems. The afferent or sensory system, myelinates caudal-cephalo whereas the efferent or cognitive system myelinates in the assumed developmental state of cephalo-caudal.

This bit of information greatly effects not only major assumptions of theories in development and learning, but more significantly perhaps, accounts for some of the developmental problems we see in maturation and learning. If we assume that all species evolve with the primary evolutional goal of survival, then we can deduce the logic of this variance from our previously assumed cephalo-caudal pattern of development. Sensory systems would necessarily develop first in the perceptor cells and proceed from there to the C. N. S. Efferent systems would myelinate first in the brain and proceed outward to the extremities.

The reintroduction of Jackson's work into developmental theory will provide a possible explanation of certain observed developmental delays; that is evidence of mental potential but delay in execution that has historically been unaccounted for except via experience.

Jackson's work can also account for much of the cognitive dissonance observed in children when sensory capabilities are apparent in the child but the cognitive

ability to account for or explain that sensory capacity is not available. It is obvious that there is delay in integration of the two systems total functioning when one system evolves more rapidly then the other. The integration of the afferent and efferent systems is delayed beyond the point in time were each system can obviously function separately but not in conjunction. This conjunctive response is not only dependent upon the myelination of the systems but also upon the neural integration of development between systems and the myelination of these integration Only then is there available to the child a neural system for action and the physical and abstract levels of thought which are derived from the child's experiences.

There is considerable dispute over locus of control in the brain and the heirarchical organization of the central nervous system. An excellent discussion is presented by Gordon Bronson (Bronson, 1965) in his article "The Heirarchical Organization of the Central Nervous System: Implications for Learning Processes and Critical Periods in Early Development". Carl Sagan in his book The Dragons of Eden also provides additional discussion to this topic. In a summary of the work of these two men, it is observed that man has evolved through three stages of brain development. First, the brain stem and its functional control of the auto-regulatory system. Second, the sub-cortical fore brain and the locus of control of the sensory systems and, finally, the neo-cortex and the highly developed perceptual and cognitive aspects of brain function. Both Bronson and Sagan agree to the multiplicity of neural networks between the three regions. The work of Houssary in Argentina and Green and Harris in England have established that the chemical flow through the blood vessels is from the neo-cortex to the other regions, particularly to the hypothalmus of the midbrain (Guillemin, 1976). These findings establish for the first time the power of the neo-cortex over the older (developmentally) regions of the brain. Educationally speaking, this finding lends serious question to legitimacy of classical and operant conditioning

models for learning, when neocortical function is present. They work, only if the subject decides to let them work.

In addition to being concerned over the implications of neural and chemical research to brain function and process, educators must also take cognizance of the prevalent literature relating to embryonic and fetal environment. Extensive studies have been done showing the effects of diet upon embryo and fetal development. Researchers at the University of California have carefully shown the effects of low protein diets upon brain cell growth. In a study of protein deprived rat embryos, the neural mass was considerably less than in protein sufficient rat embryos. It was also found that this produced a two-generation effect. It is during the embryonic period that brain cell numbers are laid down. All growth continues from that period onward. This supports the findings of Churchill that mother's diet effects children's intelligence, (Gott, 1977). Other studies have shown the effects upon birthweight, gestational period and mortality rate (Gott, 1977; Fleck, 1971; Montogue, 1964, Moyer, 1973).

If education can accept this data into the field of knowledge for educational research and practice, it would seem that major reconstruction of educational theory and practice would result. To wit:

- Any educational research and practice must include not only assessment of the general ability under assessment; but, also the effects upon other abilities in both qualitative and quantitative terms.
- Assessments of educational theory and practice must include longitudinal time factors far beyond what has been done.
- Neither the scientific rigidity of research by the behaviorist, nor the global assessment by the humanist can be acceptable without a knowledge of the general development of the individual in both psychological and behavioral elements.

- Research and educational practice must change from remediation to prevention. This includes pre-parent education, biological or genetic counseling and perinatal education.
- The present knowledge of the evolution and development of the brain must be incorporated theoretically into educational research and practice.

In conclusion, the authors care neither to challenge nor to question the present theoretical positions in education; but, to direct attention to a burgeoning field of knowledge in another area that relates directly to future research in education. Educators must re-assess the philosophical and theoretical stances taken to incorporate this new knowledge so vital to the developing human.

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